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OPEN MEETING COVER SHEET

MEMORANDUM AND PROSED ORDER

MEETING DATE:	February 10, 2022
DATE DELIVERED:	February 8, 2022
AGENDA ITEM NO.:	26
CAPTION:	Project No. 52934 – Review of Rules Adopted by the Independent Organization
DESCRIPTION:	Memo and Proposed Order

Public Utility Commission of Texas

Memorandum

TO: Chairman Peter Lake
Commissioner Will McAdams
Commissioner Lori Cobos
Commissioner Jimmy Glotfelty

FROM: Rebecca Zerwas, Market Analysis

DATE: February 8, 2022

RE: February 10, 2022 Open Meeting – Item No. 26
Project No. 52934 – *Review of Rules Adopted by the Independent Organization (Discussion and possible action)*

Senate Bill (SB) 2 (87th Legislature, Regular Session) requires both the Commission and the Electric Reliability Council of Texas (ERCOT) to establish processes for Commission approval of any rules or protocols adopted under authority delegated from the Commission to the independent organization. Commission Staff will utilize Project No. 52307, *Review of Rules Adopted by the Independent Organization in Calendar Year 2021*, to facilitate this review and approval. Staff continues to work with ERCOT on amendments to the revision request approval process in anticipation of Project No. 52301, *ERCOT Governance and Related Issues*, and a full implementation of SB2.

Since the Commission adopted an order approving the last set of ERCOT rules at the January 27, 2022 Open Meeting, the Technical Advisory Committee (TAC) met and passed three additional rules through the stakeholder process. These include one Retail Market Guide Revision Request (RMGRR), one Nodal Operating Guide Revision Requests (NOGRR), and one Verifiable Cost Manual Revision Requests (VMCRR). These matters are now pending at the Commission prior to ERCOT implementation.

Staff requests consideration of three rules approved by TAC at its January 31, 2022 meeting:

- RMGRR166, *Revising Timing for Switch Hold Extract Availability*. Staff recommends approval to allow switch hold information provided by the TDSPs to be available to REPs in a more timely manner.
- NOGRR235, *Combining Greyboxes and Other Corrections*. Staff recommends approval to provide clarity to ERCOT rules by combining approved greybox language and making small corrections to reflect accurate the intent of previously approved NOGRRs.
- VCMRR032, *Calculation of Average Running Hours per Start when Determining the Variable O&M for QSGRs*. Staff recommends approval to clarify the average run time per start calculation for Quick Start Generation Resources.

Included for your review are the TAC Report and ERCOT Impact Analysis. These documents are intended to provide a comprehensive overview describing the revisions, including ERCOT's market impact statement.

Please find attached a proposed order for your consideration consistent with Staff's recommendation in this memo.

[illegible]

² PURA § 39.151(g-6).

The Commission finds that these revisions are necessary for the proper functioning of the ERCOT market as demonstrated by the supporting material and the Commission issues the following orders:

1. The Commission approves RMGRR 166 and market impact statement.
2. The Commission approves NOGRR 235 and market impact statement.
3. The Commission approves VCMRR 032 and market impact statement.

Signed at Austin, Texas the _____ day of _____ 2022.

PUBLIC UTILITY COMMISSION OF TEXAS

PETER M. LAKE, CHAIRMAN

WILL MCADAMS, COMMISSIONER

LORI COBOS, COMMISSIONER

JIMMY GLOTFELTY, COMMISSIONER

TAC Report

RMGRR Number	<u>166</u>	RMGRR Title	Revising Timing for Switch Hold Extract Availability
Date of Decision	January 31, 2022		
Action	Recommended Approval		
Timeline	Normal		
Proposed Effective Date	March 1, 2022		
Priority and Rank Assigned	Not applicable		
Retail Market Guide Sections Requiring Revision	7.16.3, Transmission and/or Distribution Service Provider Switch Hold Notification for Meter Tampering 7.17.2, Transmission and/or Distribution Service Provider Switch Hold Notification for Payment Plans		
Related Documents Requiring Revision/Related Revision Requests	None		
Revision Description	This Retail Market Guide Revision Request (RMGRR) revises the timing for Retail Electric Providers (REPs) to access the daily switch hold files that are posted by the Transmission and/or Distribution Service Providers (TDSPs) per subsection (l)(1) of P.U.C. SUBST. R. 25.480, Bill Payment and Adjustments, and subsection (g) of P.U.C. SUBST. R. 25.126, Adjustments Due to Non-Compliant Meters and Meter Tampering in Areas Where Customer Choice Has Been Introduced.		
Reason for Revision	<input checked="" type="checkbox"/> Addresses current operational issues. <input type="checkbox"/> Meets Strategic goals (tied to the <u>ERCOT Strategic Plan</u> or directed by the ERCOT Board). <input checked="" type="checkbox"/> Market efficiencies or enhancements <input type="checkbox"/> Administrative <input type="checkbox"/> Regulatory requirements <input type="checkbox"/> Other: (explain) <i>(please select all that apply)</i>		

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Business Case	<p>This RMGRR improves the Competitive Retailers' (CRs') ability to make efficient and timely use of the switch hold information provided by the TDSPs to avoid out-of-sync conditions and provide for a better Customer experience when enrolling a Premise. Currently, as written, daily switch hold files are not available and uploaded for at least two hours after the start of the Business Day (0700) thus potentially leading to incorrect information being communicated to the Customer.</p>
RMS Decision	<p>On 6/9/21, RMS voted unanimously via roll call to recommend approval of RMGRR166 as revised by RMS. All Market Segments participated in the vote.</p> <p>On 7/13/21, RMS voted unanimously via roll call to table RMGRR166 for one month. All Market Segments participated in the vote.</p> <p>On 8/3/21, RMS voted unanimously via roll call to table RMGRR166. All Market Segments participated in the vote.</p> <p>On 12/7/21, RMS voted unanimously via roll call to recommend approval of RMGRR166 as amended by the 9/30/21 Texas Data Transport and MarkeTrak Systems (TDTMS) Working Group comments. All Market Segments participated in the vote.</p> <p>On 1/11/22, RMS voted unanimously via roll call to endorse and forward to TAC the 12/7/21 RMS Report and the Impact Analysis for RMGRR166. All Market Segments participated in the vote.</p>
Summary of RMS Discussion	<p>On 6/9/21, participants added references to P.U.C. SUBST. R. 25.126 to the Revision Description and to paragraph (1) of Section 7.16.3.</p> <p>On 7/13/21, there was no discussion.</p> <p>On 8/3/21, ERCOT Staff explained that, due to P.U.C. Rules, ERCOT is unable to host RMGRR166's switch hold repository; participants expressed their intention to extract the repository requirements from RMGRR166.</p> <p>On 12/7/21, participants reviewed the 9/30/21 TDTMS comments. ERCOT Staff reminded participants that amending RMGRR166 via the 9/30/21 TDTMS comments is expected to generate a Revised Impact Analysis.</p> <p>On 1/11/22, participants discussed the anticipated timing of RMGRR166's approval and effective date.</p>
TAC Decision	<p>On 1/31/22, TAC voted unanimously via roll call to recommend</p>

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	approval of RMGRR166 as recommended by RMS in the 1/11/22 RMS Report. All Market Segments participated in the vote.
Summary of TAC Discussion	On 1/31/22, TAC reviewed the ERCOT Opinion and ERCOT Market Impact Statement for RMGRR166.
ERCOT Opinion	ERCOT supports approval of RMGRR166.
ERCOT Market Impact Statement	ERCOT Staff has reviewed RMGRR166 and believes the market impact for RMGRR166 addresses current operational issues and market efficiencies/enhancements by revising the time for REPs to access the daily switch hold files that are posted by TDSPs.

Sponsor	
Name	Sheri Wiegand on behalf of TDTMS
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Market Segment	Not Applicable

Market Rules Staff Contact	
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Comments Received	
Comment Author	Comment Summary
ERCOT 070821	Proposed an alternative schedule to complete the Impact Analysis for RMGRR166 prior to the August 3, 2021 RMS meeting
ERCOT 080221	Proposed an alternative schedule to complete the Impact Analysis for RMGRR166 prior to the September 14, 2021 RMS meeting
ERCOT 090721	Proposed an alternative schedule to complete the Impact Analysis for RMGRR166 prior to the October 5, 2021 RMS meeting

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TDMS 093021	Replaced language that created a singular switch hold repository with language that revises the timing in which REPs can access daily switch hold files
ERCOT 100421	Proposed an alternative schedule to complete the Impact Analysis for RMGRR166 prior to the November 2, 2021 RMS meeting
ERCOT 102121	Proposed an alternative schedule to complete the Impact Analysis for RMGRR166 prior to the December 7, 2021 RMS meeting
ERCOT 113021	Proposed an alternative schedule to complete the Impact Analysis for RMGRR166 prior to the January 11, 2022 RMS meeting

Market Rules Notes

Please note administrative changes have been made below and authored as “ERCOT Market Rules”.

Proposed Guide Language Revision

7.16.3 Transmission and/or Distribution Service Provider Switch Hold Notification for Meter Tampering

- (1) In accordance with subsection (g) of P.U.C. SUBST. R. 25.126, Adjustments Due to Non-Compliant Meters and Meter Tampering in Areas Where Customer Choice Has Been Introduced, the TDSP shall create and maintain a list of all ESI IDs with switch holds that REPs may access through a secure means (web portal or File Transfer Protocol (FTP) site). The list shall not include any Customer information other than the ESI ID and date the switch hold was placed. The list shall be updated daily, and posted no later than 0500 Central Prevailing Time (CPT) each day representing switch hold revisions of the prior Business Day.

- (2) The TDSP shall send an 814_20, ESI ID Maintenance Request, to ERCOT indicating the addition of a switch hold. The switch hold status will be posted by ERCOT to the Find ESI ID function on the Market Information System (MIS) Secure Area.

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- (3) The CR can request to remove the switch hold indicator for payment plan or tampering by submitting the 650_01, Service Order Request, with the specific removal code to the TDSP. If applicable, the TDSP shall send an 814_20 transaction to ERCOT indicating the removal of the appropriate switch hold as requested by the REP of record in the 650_01 transaction.

7.17.2 Transmission and/or Distribution Service Provider Switch Hold Notification for Payment Plans

- (1) In accordance with subsection (l)(1) of P.U.C. SUBST. R. 25.480, Bill Payment and Adjustments, the TDSP shall create and maintain a list of all Electric Service Identifiers (ESI IDs) with switch holds due to payment plans that Retail Electric Providers (REPs) may access through a secure means (web portal or File Transfer Protocol (FTP) site). The list shall not include any Customer information other than the ESI ID and date the switch hold was placed. The list shall be updated daily, and posted no later than 0500 Central Prevailing Time (CPT) each day representing switch hold revisions of the prior Business Day.
- (2) The TDSP shall send an 814_20, ESI ID Maintenance Request, to ERCOT indicating the addition of a switch hold. The switch hold status will be posted by ERCOT to the Find ESI ID function on the Market Information System (MIS) Secure Area.
- (3) The Competitive Retailer (CR) can request to remove the switch hold indicator for payment plan or tampering by submitting the 650_01, Service Order Request, with the specific removal code to the TDSP. If applicable, the TDSP shall send an 814_20 transaction to ERCOT indicating the removal of the appropriate switch hold as requested by the REP of record in the 650_01 transaction.

ERCOT Impact Analysis Report

RMGRR Number	<u>166</u>	RMGRR Title	Revising Timing for Switch Hold Extract Availability
Impact Analysis Date	December 16, 2021		
Estimated Cost/Budgetary Impact	None.		
Estimated Time Requirements	No project required. This Retail Market Guide Revision Request (RMGRR) can take effect upon Public Utility Commission of Texas (PUCT) approval.		
ERCOT Staffing Impacts (across all areas)	Ongoing Requirements: No impacts to ERCOT staffing.		
ERCOT Computer System Impacts	No impacts to ERCOT computer systems.		
ERCOT Business Function Impacts	No impacts to ERCOT business functions.		
Grid Operations & Practices Impacts	No impacts to ERCOT grid operations and practices.		

Evaluation of Interim Solutions or Alternatives for a More Efficient Implementation

None offered.

Comments

None.

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NOGRR Number	<u>235</u>	NOGRR Title	Combining Greyboxes and Other Corrections
Date of Decision	January 31, 2022		
Action	Recommended Approval		
Timeline	Normal		
Proposed Effective Date	March 1, 2022		
Priority and Rank Assigned	Not Applicable		
Nodal Operating Guide Sections Requiring Revision	2.9.1, Additional Voltage Ride-Through Requirements for Intermittent Renewable Resources 3.3.2.1, Corrected Until Reactive Limits (CURL) 6.1.3.3, Data Recording and Redundancy Requirements		
Related Documents Requiring Revision/Related Revision Requests	None		
Revision Description	This Nodal Operating Guide Revision Request (NOGRR) is submitted for transparency purposes to make small corrections to language associated with NOGRR210, Related to NPRR1005, Clarify Definition of Point of Interconnection (POI) and Add Definition Point of Interconnection Bus (POIB), and NOGRR227, Add Phasor Measurement Recording Equipment Location for Main Power Transformer for Intermittent Renewable Resource (IRR), and to combine greyboxes in Section 3.3.2.1.		
Reason for Revision	<input type="checkbox"/> Addresses current operational issues. <input type="checkbox"/> Meets Strategic goals (tied to the <u>ERCOT Strategic Plan</u> or directed by the ERCOT Board). <input type="checkbox"/> Market efficiencies or enhancements <input checked="" type="checkbox"/> Administrative <input type="checkbox"/> Regulatory requirements <input type="checkbox"/> Other: (explain) <i>(please select all that apply)</i>		
Business Case	This NOGRR provides transparency to small language revisions or		

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	clarifications inadvertently omitted but in keeping with the intent of the relative NOGRRs, and to the combination of greyboxes for language that was approved at the same time.
ROS Decision	<p>On 11/4/21, ROS voted unanimously via roll call to recommend approval of NOGRR235 as submitted. All Market Segments participated in the vote.</p> <p>On 12/2/21, ROS voted unanimously via roll call to endorse and forward to TAC the 11/4/21 ROS Report and the Impact Analysis for NOGRR235. All Market Segments participated in the vote.</p>
Summary of ROS Discussion	<p>On 11/4/21, there was no discussion.</p> <p>On 12/2/21, participants reviewed the Impact Analysis.</p>
TAC Decision	On 1/31/22, TAC voted unanimously via roll call to recommend approval of NOGRR235 as recommended by ROS in the 12/2/21 ROS Report. All Market Segments participated in the vote.
Summary of TAC Discussion	On 1/31/22, TAC reviewed the ERCOT Opinion and ERCOT Market Impact Statement for NOGRR235.
ERCOT Opinion	ERCOT supports approval of NOGRR235.
ERCOT Market Impact Statement	ERCOT Staff has reviewed NOGRR235 and believes the market impact for NOGRR235 provides transparency to small language revisions and clarification.

Sponsor	
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Cell Number	
Market Segment	Not Applicable

Market Rules Staff Contact	
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Comments Received	
Comment Author	Comment Summary
None	

Market Rules Notes

Please note the baseline language in the following sections has been updated to reflect the incorporation of the following NOGRR(s) into the Nodal Operating Guide:

- NOGRR227, Add Phasor Measurement Recording Equipment Location for Main Power Transformer for Intermittent Renewable Resource (IRR) (incorporated 11/1/21)
 - Section 6.1.3.3
- NOGRR212, Related to NPRR1016, Clarify Requirements for Distribution Generation Resources (DGRs) and Distribution Energy Storage Resources (DESRs) (incorporated 1/1/22)
 - Section 2.9.1
- NOGRR210, Related to NPRR1005, Clarify Definition of Point of Interconnection (POI) and Add Definition Point of Interconnection Bus (POIB) (unboxed 2/1/22)
 - Section 3.3.2.1

Proposed Guide Language Revision

2.9.1 *Voltage Ride-Through Requirements for Intermittent Renewable Resources Connected to the ERCOT Transmission Grid*

- (1) All Intermittent Renewable Resources (IRRs) that interconnect to the ERCOT Transmission Grid shall comply with the requirements of this Section, except as follows:
 - (a) An IRR that interconnects to the ERCOT Transmission Grid pursuant to a Standard Generation Interconnection Agreement (SGIA) (i) executed on or before January 16, 2014 and (ii) under which the IRR provided all required financial security to the TSP on or before January 16, 2014, is not required to meet any high VRT requirement greater than 1.1 per unit voltage unless the interconnected IRR includes one or more turbines that differ from the turbine model(s) described in the SGIA (including any attachment thereto), as that agreement existed on January 16, 2014. Notwithstanding the foregoing, if the Resource Entity that owns or operates an IRR that was interconnected pursuant to an SGIA executed before January 16, 2014, under which the IRR provided all required financial security to the TSP on or before January 16, 2014, demonstrates to ERCOT's satisfaction that the high VRT capability of the IRR is not lower than the capability of the turbine model(s) described in the SGIA (including any

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attachment thereto), as that agreement existed on January 16, 2014 that IRR is not required to meet the high VRT requirement in this Section.

- (b) An IRR that interconnects to the ERCOT System pursuant to an SGIA executed prior to November 1, 2008 is not required to meet VRT requirements presented in this Section. However, any Wind-powered Generation Resource (WGR) that is installed on or after November 1, 2008 and that initially synchronizes with the ERCOT System, pursuant to an SGIA (i) executed on or before January 16, 2014, and (ii) under which the IRR provided all required financial security to the TSP on or before January 16, 2014 (except for an IRR installed pursuant to an SGIA executed before November 1, 2008) shall be VRT-capable in accordance with the low VRT requirements in this Section and high-voltage requirements in this Section up to 1.1 per unit voltage unless the interconnected IRR includes one or more turbines that differ from the turbine model(s) described in the SGIA (including any attachment thereto), as that agreement existed on January 16, 2014 in which case the IRR shall also be required to comply with the high VRT requirements of this Section, subject to the exemption described in paragraph (a), above.
- (c) An IRR that is not technically capable of complying with a 1.2 per unit voltage high VRT requirement and that is not subject to either of the exemptions described in paragraphs (a) or (b), above, is not required to meet any high VRT requirement greater than 1.1 per unit voltage until January 16, 2016.
- (d) Notwithstanding any of the foregoing provisions, an IRR's VRT capability shall not be reduced over time.
- (2) Each IRR shall provide technical documentation of VRT capability to ERCOT upon request.
- (3) Each IRR is required to set generator voltage relays to remain in service for at least 0.15 seconds during all transmission faults and to allow the system to recover as illustrated in Figure 1, Default Voltage Ride-Through Boundaries for IRRs Connected to the ERCOT Transmission Grid, below. Recovery time to 90% of per unit voltage should be within 1.75 seconds. Faults on individual phases with delayed clearing (zone 2) may result in phase voltages outside this boundary but if the phase voltages remain inside this boundary, then generator voltage relays are required to be set to remain connected and recover as illustrated in Figure 1.
- (4) Each IRR shall remain interconnected during three-phase faults on the ERCOT System for a voltage level as low as zero volts with a duration of 0.15 seconds as measured at the Point of Interconnection Bus (POIB) unless a shorter clearing time requirement for a three-phase fault specific to the generating plant POIB is determined by and documented by the TSP in conjunction with the SGIA. The clearing time requirement shall not exceed nine cycles.
- (5) Each IRR shall set generator voltage relays to remain interconnected to the ERCOT System during the following high-voltage conditions, as illustrated in Figure 1: any per-unit voltage equal to or greater than 1.175 but less than 1.2 for up to 0.2 seconds, any per-

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unit voltage equal to or greater than 1.15 but less than 1.175 per unit voltage for up to 0.5 seconds, and any per-unit voltage equal to or greater than 1.1 but less than 1.15 for up to 1.0 seconds. The indicated voltages are measured at the POIB.

- (6) An IRR may be tripped Off-Line or curtailed after the fault clearing period if this action is part of an approved Remedial Action Scheme (RAS).
- (7) VRT requirements may be met by the performance of the generators; by installing additional reactive equipment behind the POI; or by a combination of generator performance and additional equipment behind the POI. VRT requirements may be met by equipment outside the POI if documented in the SGIA.
- (8) If an IRR fails to comply with the clearing time or recovery VRT requirement, then the IRR and the interconnecting TSP shall be required to investigate and report to ERCOT on the cause of the IRR trip, identifying a reasonable mitigation plan and timeline.

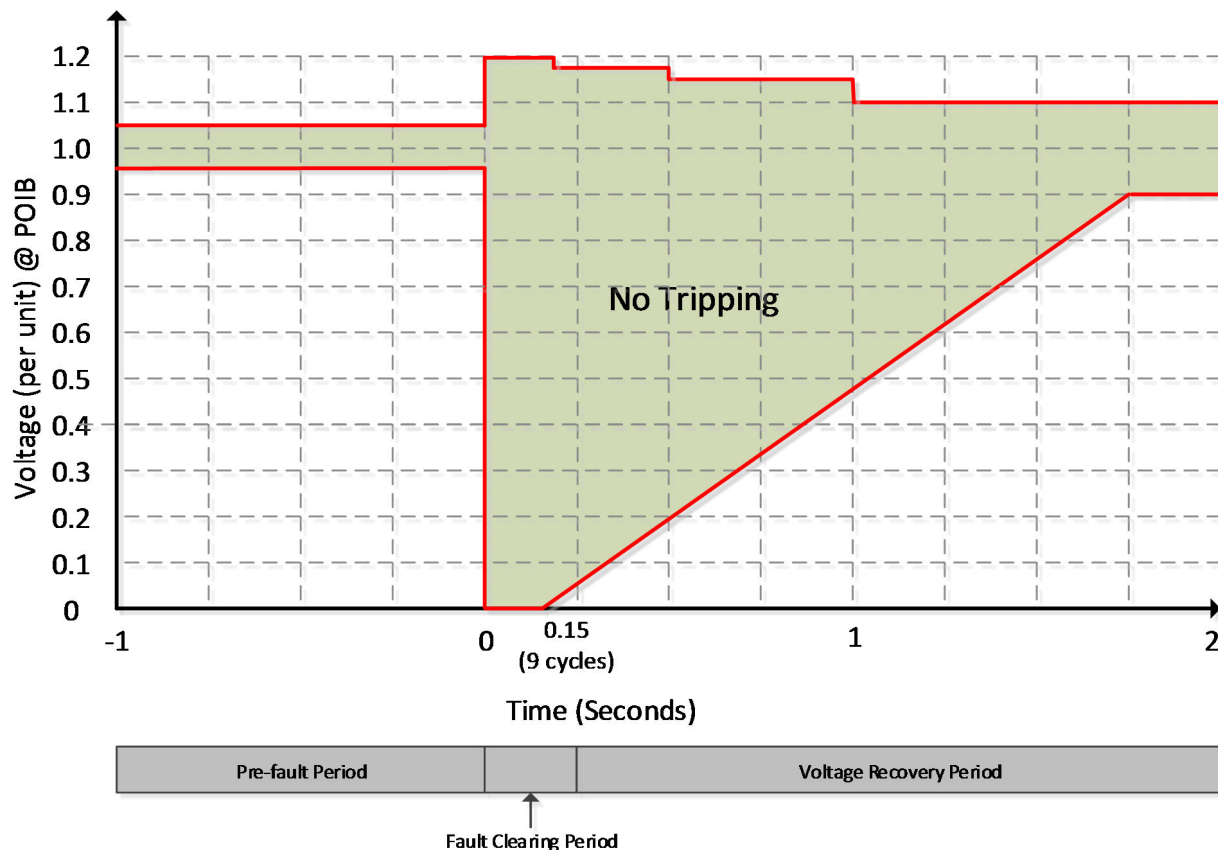


Figure 1: Default Voltage Ride-Through Boundaries for IRRs Connected to the ERCOT Transmission Grid

[NOGRR204: Replace Section 2.9.1 above with the following upon system implementation of NPRR989:]

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2.9.1 *Voltage Ride-Through Requirements for Intermittent Renewable Resources and Energy Storage Resources Connected to the ERCOT Transmission Grid*

- (1) All Intermittent Renewable Resources (IRRs) and ESRs that interconnect to the ERCOT Transmission Grid shall also comply with the requirements of this Section, except as follows:
 - (a) An IRR that interconnects to the ERCOT Transmission Grid pursuant to a Standard Generation Interconnection Agreement (SGIA) (i) executed on or before January 16, 2014 and (ii) under which the IRR provided all required financial security to the TSP on or before January 16, 2014, is not required to meet any high VRT requirement greater than 1.1 per unit voltage unless the interconnected IRR includes one or more turbines that differ from the turbine model(s) described in the SGIA (including any attachment thereto), as that agreement existed on January 16, 2014. Notwithstanding the foregoing, if the Resource Entity that owns or operates an IRR that was interconnected pursuant to an SGIA executed before January 16, 2014, under which the IRR provided all required financial security to the TSP on or before January 16, 2014, demonstrates to ERCOT's satisfaction that the high VRT capability of the IRR is not lower than the capability of the turbine model(s) described in the SGIA (including any attachment thereto), as that agreement existed on January 16, 2014 that IRR is not required to meet the high VRT requirement in this Section.
 - (b) An IRR that interconnects to the ERCOT System pursuant to an SGIA executed prior to November 1, 2008 is not required to meet VRT requirements presented in this Section. However, any Wind-powered Generation Resource (WGR) that is installed on or after November 1, 2008 and that initially synchronizes with the ERCOT System, pursuant to an SGIA (i) executed on or before January 16, 2014, and (ii) under which the IRR provided all required financial security to the TSP on or before January 16, 2014 (except for an IRR installed pursuant to an SGIA executed before November 1, 2008) shall be VRT-capable in accordance with the low VRT requirements in this Section and high-voltage requirements in this Section up to 1.1 per unit voltage unless the interconnected IRR includes one or more turbines that differ from the turbine model(s) described in the SGIA (including any attachment thereto), as that agreement existed on January 16, 2014 in which case the IRR shall also be required to comply with the high VRT requirements of this Section, subject to the exemption described in paragraph (a), above.
 - (c) An IRR that is not technically capable of complying with a 1.2 per unit voltage high VRT requirement and that is not subject to either of the exemptions described in paragraphs (a) or (b), above, is not required to meet any high VRT requirement greater than 1.1 per unit voltage until January 16, 2016.
 - (d) Notwithstanding any of the foregoing provisions, an IRR's VRT capability shall not be reduced over time.
- (2) Each IRR or ESR shall provide technical documentation of VRT capability to ERCOT upon request.

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- (3) Each IRR or ESR is required to set its voltage relays to remain in service for at least 0.15 seconds during all transmission faults and to allow the system to recover as illustrated in Figure 1, Default Voltage Ride-Through Boundaries for IRRs and ESRs Connected to the ERCOT Transmission Grid, below. Recovery time to 90% of per unit voltage should be within 1.75 seconds. Faults on individual phases with delayed clearing (zone 2) may result in phase voltages outside this boundary but if the phase voltages remain inside this boundary, then Resource voltage relays are required to be set to remain connected and recover as illustrated in Figure 1.
- (4) Each IRR or ESR shall remain interconnected during three-phase faults on the ERCOT System for a voltage level as low as zero volts with a duration of 0.15 seconds as measured at the Point of Interconnection Bus (POIB) unless a shorter clearing time requirement for a three-phase fault specific to the POIB is determined by and documented by the TSP in conjunction with the SGIA. The clearing time requirement shall not exceed nine cycles.
- (5) Each IRR or ESR shall set its voltage relays to remain interconnected to the ERCOT System during the following high-voltage conditions, as illustrated in Figure 1: any per-unit voltage equal to or greater than 1.175 but less than 1.2 for up to 0.2 seconds, any per-unit voltage equal to or greater than 1.15 but less than 1.175 per unit voltage for up to 0.5 seconds, and any per-unit voltage equal to or greater than 1.1 but less than 1.15 for up to 1.0 seconds. The indicated voltages are measured at the POIB.
- (6) An IRR or ESR may be tripped Off-Line or curtailed after the fault clearing period if this action is part of an approved Remedial Action Scheme (RAS).
- (7) VRT requirements may be met by the performance of the Resource; by installing additional reactive equipment behind the POI; or by a combination of Resource performance and additional equipment behind the POI. VRT requirements may be met by equipment outside the POI if documented in the SGIA.
- (8) If an IRR or ESR fails to comply with the clearing time or recovery VRT requirement, then the Resource Entity and the interconnecting TSP shall be required to investigate and report to ERCOT on the cause of the Resource's trip, identifying a reasonable mitigation plan and timeline.

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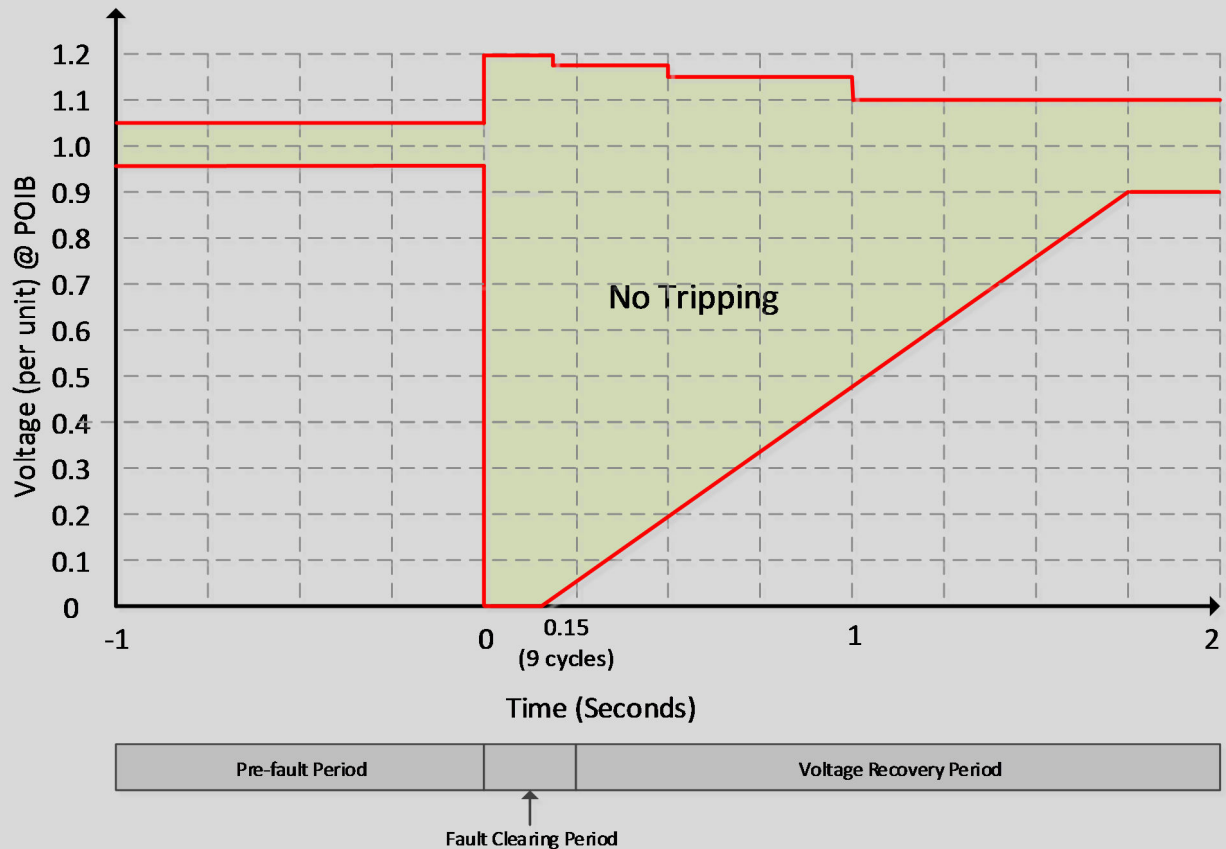


Figure 1: Default Voltage Ride-Through Boundaries for IRRs and ESRs Connected to the ERCOT Transmission Grid

3.3.2.1 Corrected Unit Reactive Limits (CURL)

- (1) A reactive capability curve and associated data for each unit on the ERCOT System shall be submitted to ERCOT through the Market Information System (MIS) Certified Area and must contain the most limiting elements for the leading and lagging reactive output. The limiting factors such as under-excitation limiters, over-excitation limiters, ambient temperature limitations across the MW range of the unit at the unit terminals or any other factor that limits the reactive output of the unit and is verifiable through engineering calculations or testing shall be updated and provided on the corrected reactive capability curve. The corrected reactive capability curve establishes the Corrected Unit Reactive Limits (CURL) at the unit terminals that ERCOT Planning and ERCOT Operations, and TSPs will use for their studies. For Intermittent Renewable Resources (IRR) the CURL data shall be reported at the low side of the generator step up transformer to the Point of Interconnection Bus (POIB). Resources will provide these updated curves and associated test data to ERCOT by submitting test information to the Net Dependable Capability and Reactive Capability (NDCRC) application located on the MIS Secure Area. Once approved by ERCOT per Section 3.5, ERCOT Implementation, Resources will provide

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updated data by submitting changes to the appropriate ERCOT Resource Registration information in accordance with Planning Guide Section 6.8, Resource Registration Procedures. Prior to including the submitted data into the Network Operations Model, ERCOT will notify the TSP to which the Resource Entity is interconnected that the test data is posted on the MIS Secure Area. ERCOT and TSPs may review the data and provide any comments within ten Business Days. ERCOT will include these changes in the future Network Operations Model and forward the changes to the TSPs and the Steady State Working Group (SSWG) for use in their studies. The CURL should be available in the Resource Entities' control room where the tests are conducted and at the QSE's Real-Time generation dispatch desk. During any test, the Generation Resource must maintain its generator cooling system at normal operating conditions, the Automatic Voltage Regulator in service and all auxiliary equipment in service that is needed for expected normal operation.

[NOGRR196: Replace Section 3.3.2.1 above with the following upon system implementation of NPRR973:]

3.3.2.1 Corrected Unit Reactive Limits (CURL)

- (1) A reactive capability curve and associated data for each unit on the ERCOT System shall be submitted to ERCOT through the Market Information System (MIS) Certified Area and must contain the most limiting elements for the leading and lagging reactive output. The limiting factors such as under-excitation limiters, over-excitation limiters, ambient temperature limitations across the MW range of the unit at the unit terminals or any other factor that limits the reactive output of the unit and is verifiable through engineering calculations or testing shall be updated and provided on the corrected reactive capability curve. The corrected reactive capability curve establishes the Corrected Unit Reactive Limits (CURL) at the unit terminals that ERCOT Planning and ERCOT Operations, and TSPs will use for their studies. For Intermittent Renewable Resources (IRRs) the CURL data shall be reported at the low side of the MPT. Resources will provide these updated curves and associated test data to ERCOT by submitting test information to the Net Dependable Capability and Reactive Capability (NDCRC) application located on the MIS Secure Area. Once approved by ERCOT per Section 3.5, ERCOT Implementation, Resources will provide updated data by submitting changes to the appropriate ERCOT Resource Registration information in accordance with Planning Guide Section 6.8, Resource Registration Procedures. Prior to including the submitted data into the Network Operations Model, ERCOT will notify the TSP to which the Resource Entity is interconnected that the test data is posted on the MIS Secure Area. ERCOT and TSPs may review the data and provide any comments within ten Business Days. ERCOT will include these changes in the future Network Operations Model and forward the changes to the TSPs and the Steady State Working Group (SSWG) for use in their studies. The CURL should be available in the Resource Entities' control room where the tests are conducted and at the QSE's Real-Time generation dispatch desk. During any test, the Generation Resource or ESR must maintain its generator cooling system at normal operating conditions, the Automatic Voltage Regulator in service and all auxiliary equipment in service that is

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needed for expected normal operation.

6.1.3.3 Data Recording and Redundancy Requirements

- (1) Recorded electrical quantities shall be sufficient to determine the following:
 - (a) For Transmission Facility owner locations meeting requirements in Section 6.1.3.2, Location Requirements:
 - (i) Phase-to-neutral voltage magnitude/angle data for each phase from at least two distinct transmission level element measurements;
 - (ii) Single phase current magnitude/angle data for each phase from at least two distinct transmission level lines; and
 - (iii) Frequency and df/dt data for at least two transmission level element measurements.
 - (b) For Generator Resource owner locations meeting requirements in Section 6.1.3.2:
 - (i) Phase-to-neutral voltage, or phase-to-phase voltage magnitude/angle data for each phase from at least one generator-interconnected bus measurement;
 - (ii) Single phase current magnitude/angle data for each phase from each interconnected generator over 20 MVA or on the high or low side of a main power transformer that represents the flow from multiple Intermittent Renewable Resources (IRRs) behind the main power transformer with total aggregated capacity greater than 20 MVA; and

[NOGRR227: Replace item (ii) above with the following upon system implementation of NPRR973:]

- (ii) Single phase current magnitude/angle data for each phase from each interconnected generator over 20 MVA or on the high or low side of a Main Power Transformer (MPT) that represents the flow from multiple Intermittent Renewable Resources (IRRs) behind the MPT with total aggregated capacity greater than 20 MVA; and
 - (iii) Frequency and df/dt data for at least one generator-interconnected bus measurement.

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NOGRR Number	<u>235</u>	NOGRR Title	Combining Greyboxes and Other Corrections
Impact Analysis Date	October 20, 2021		
Estimated Cost/Budgetary Impact	None.		
Estimated Time Requirements	No project required. This Nodal Operating Guide Revision Request (NOGRR) can take effect upon Public Utility Commission of Texas (PUCT) approval.		
ERCOT Staffing Impacts (across all areas)	Ongoing Requirements: No impacts to ERCOT staffing.		
ERCOT Computer System Impacts	No impacts to ERCOT computer systems.		
ERCOT Business Function Impacts	No impacts to ERCOT business functions.		
Grid Operations & Practices Impacts	No impacts to ERCOT grid operations and practices.		

Evaluation of Interim Solutions or Alternatives for a More Efficient Implementation

None offered.

Comments

None.

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VCMRR Number	<u>032</u>	VCMRR Title	Calculation of Average Running Hours per Start when Determining the Variable O&M for QSGRs
Date of Decision	January 31, 2022		
Action	Recommended Approval		
Timeline	Normal		
Proposed Effective Date	March 1, 2022		
Priority and Rank Assigned	Not Applicable		
Verifiable Cost Manual Sections Requiring Revision	Appendix 7: Calculation of the Variable O&M Value and Incremental Heat Rate used in Real Time Mitigation for Quick Start Generation Resources (QSGRs)		
Related Documents Requiring Revision/Related Revision Requests	None		
Revision Description	This Verifiable Cost Manual Revision Request (VCMRR) clarifies that the average run time per start is calculated by dividing the total running hours by the total number of starts during the 20 consecutive day period, and ensures that at a minimum, one start will be used in the calculation of the average run time per start when the Resource is operating on the first interval of the first day of the 20 consecutive day period.		
Reason for Revision	<input checked="" type="checkbox"/> Addresses current operational issues. <input type="checkbox"/> Meets Strategic goals (tied to the <u>ERCOT Strategic Plan</u> or directed by the ERCOT Board). <input checked="" type="checkbox"/> Market efficiencies or enhancements <input type="checkbox"/> Administrative <input type="checkbox"/> Regulatory requirements <input type="checkbox"/> Other: (explain) <i>(please select all that apply)</i>		
Business Case	This VCMRR provides clarification on the calculation of the average run time per start for Quick Start Generation Resources (QSGRs). Specifically, Appendix 7 provides a definition of the calculated		

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	<p>average run time per start but is not clear that this should be calculated by dividing the total running hours by the total number of starts during the 20 consecutive day period as described in the Verifiable Cost Manual.</p> <p>Furthermore, this VCMRR proposes a change in the calculation of the number of starts for the 20 day period. ERCOT proposes that one additional start should be calculated when the Resource is operating during the first interval of the first day of the 20 consecutive day period. This will ensure that the total number of running hours will be divided by at least one start when the Resource is running continuously over the 20 consecutive day period or when the Resource did not start during the 20 consecutive day period but was running at the beginning of this period.</p>
WMS Decision	<p>On 11/3/21, WMS voted unanimously via roll call to recommend approval of VCMRR032 as submitted. All Market Segments participated in the vote.</p> <p>On 12/1/21, WMS voted unanimously via roll call to endorse and forward to TAC the 11/3/21 WMS Report and Impact Analysis for VCMRR032. All Market Segments participated in the vote.</p>
Summary of WMS Discussion	<p>On 11/3/21, there was no discussion.</p> <p>On 12/1/21, participants reviewed the Impact Analysis for VCMRR032.</p>
TAC Decision	<p>On 1/31/22, TAC voted unanimously via roll call to recommend approval of VCMRR032 as recommended by WMS in the 12/1/21 WMS Report. All Market Segments participated in the vote.</p>
Summary of TAC Discussion	<p>On 1/31/22, TAC reviewed the ERCOT Opinion and ERCOT Market Impact Statement for VCMRR032.</p>
ERCOT Opinion	<p>ERCOT supports approval of VCMRR032.</p>
ERCOT Market Impact Statement	<p>ERCOT Staff has reviewed VCMRR032 and believes the market impact for VCMRR032 will be to address current operational issues by clarification of the calculation of the average run time per start for QSGRs.</p>

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Comments Received	
Comment Author	Comment Summary
None	

Market Rules Notes
None
Proposed Verifiable Cost Manual Language Revision

Appendix 7: Calculation of the Variable O&M Value and Incremental Heat Rate used in Real Time Mitigation for Quick Start Generation Resources (QSGRs)

Variable O&M rate (\$/MWh) = Variable O&M (above LSL) + Startup Costs (\$) / G (MWh)

Where

Variable O&M (above LSL) = approved Variable O&M above LSL if filed in a resources verifiable costs filing or 0 if not filed.

Startup Costs = Startup O&M Cost + Startup Fuel Cost

Startup O&M Cost = Approved Startup O&M Costs in a cold start position (Verified (QSGR mode) or Standard) or Resource Specific Generic Startup O&M Costs

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Startup Fuel Cost = 90% of the approved fuel rate in a cold start position times the sum of the average fuel price for the first 15 days of the previous month and the fuel adder.

G = average generation during Minimum up time (MWh)

Where

$$G \text{ (MWh)} = 75\% * \text{HSL (MW)} * L \text{ (Hr)}$$

and

HSL (MW) = average of the seasonal HSL in the Resource Registration data

L = Max {Resource Registration Min Up Time, Average number of running hours per start in period, or 2} (hr)

Where:

Average number of running hours per start in period = average run time per start over the 20 consecutive day period for electrical and physically similar QSGRs at the same plant site. The average run time per start shall be determined by dividing the total running hours by the total number of starts during the 20 consecutive day period. For Resources operating on the first interval of the first day of the 20 consecutive day period, an additional start shall be considered in the calculation of the average run time.

The equation for calculating Variable O&M rate for QSGR in the MOC is as follows:

$$\text{Variable O\&M rate (\$/MWh)} = \text{Variable O\&M (above LSL)} + \text{Startup Costs (\$)} / \{75\% * \text{HSL (MW)} * L \text{ (HR)}\}$$

Adj. Incremental Heat Rate_p (MMBtu/MWh) = (Incremental Heat rate_p + Minimum Energy Component)

Where

Incremental Heat rate_p (IHR_p) = approved incremental heat rate (IHR) points file in the resource verifiable cost filing or the generic IHR in the Protocols

Where:

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p = number of incremental heat rate point pairs (i.e. MW and IHR) used to describe the cost of the next MW of generation

Minimum Energy Component (MEC) = the difference between the Average Heat Rate (AHR) and the Incremental Heat Rate (IHR) at the Midpoint of the QSGR Dispatch Range. These heat rate values shall be based on the values provided in the resource verifiable cost filing or 0 if the resource has not filed for verifiable costs.

Where:

$$\text{Midpoint of QSGR Dispatch Range (MDR)} = \text{HSL} - (\text{HSL} - \text{LSL}) * 50\%$$

$$\text{MEC} = \text{AHR}_{\text{@MDR}} - \text{IHR}_{\text{@MDR}}$$

The equation for calculating Adj. Incremental Heat Rate for QSGR used in the MOC calculations is as follows:

$$\text{Adj. Incremental Heat Rate}_p \text{ (MMBtu/MWh)} = \text{IHR}_p + \text{MEC}$$

Sample Calculation

- HSL = 70 MW
- Start O&M = \$1,505/Start
- Start Fuel = 100 MMBtu
- Variable O&M (above LSL) = \$1.5/MWh
- Resource Registration Min Up Time = 1 hour
- Actual Run Time = 1 hour
- Fuel Index Price (FIP) = \$5/MMBtu
- Resource fuel adder = \$0.50/MMBtu
- IHR = 10 MMBtu/MWh
- MEC = 2.5 MMBtu/MWh
- Fuel Adder = \$0.50/MMBtu

Start Fuel adjusted for energy produced during startup = Start Fuel * 90%

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Therefore to determine Variable O&M rate:

$$\text{Variable O\&M rate (\$/MWh)} = \text{Variable O\&M (above LSL)} + \text{Startup Costs (\$)} / \{75\% * \text{HSL (MW)} * \text{L (Hr)}\}$$

- Startup costs = \$1,505 + (100 MMBtu + (100 MMBtu * 0.1)) * 90% * \$5/MMBtu
$$= \$1,505 + (110 \text{ MMBtu}) * 90\% * \$5/\text{MMBtu}$$
$$= \$1,505 + \$495 = \$2,000$$
- L = Max {Resource Registration Min Up Time, Average number of running hours in period, or 2} (hr)
$$= \text{Max}\{1, 1, 2\} = 2$$
- Variable O&M rate (\$/MWh) = \$1.50/MWh + \$2,000 / (75% * 70 * 2)
$$= \$20.55/\text{MWh}$$

And to calculate Incremental Heat Rate for one point:

$$\text{Adj. Incremental Heat Rate}_p \text{ (MMBtu/MWh)} = \text{IHR}_p + \text{MEC}$$

- $\text{IHR}_{p1} = 10 \text{ MMBtu/MWh} + 2.5 \text{ MMBtu/MWh}$
$$= 12.5 \text{ MMBtu/MWh}$$

Therefore the Mitigated Offer Cap (MOC) calculations are as follows:

$$\text{MOC (\$/MWh)} = (\text{IHR}_p * (\text{FIP} + \text{FA}) + \text{Variable O\&M rate}) * W$$

Where

- W = Capacity Factor Multiplier (range of multipliers defined in Protocol Section 4.4.9.4.1, Mitigated Offer Cap) = 1.40
- $\text{MOC} = (12.5 \text{ MMBtu/MWh} * (\$5/\text{MMBtu} + \$0.50) + \$20.55/\text{MWh}) * 1.4$
$$= (\$68.75/\text{MWh} + \$20.55/\text{MWh}) * 1.4$$
$$= (\$89.30) * 1.4 = \$125.02/\text{MWh}$$

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ERCOT Impact Analysis Report

VCMRR Number	<u>032</u>	VCMRR Title	Calculation of Average Running Hours per Start when Determining the Variable O&M for QSGRs
Impact Analysis Date	October 19, 2021		
Estimated Cost/Budgetary Impact	Less than \$5k, which will be absorbed by the Operations & Maintenance (O&M) budgets of affected department.		
Estimated Time Requirements	No project required. This Verifiable Cost Manual Revision Request (VCMRR) can take effect upon Public Utility Commission of Texas (PUCT) approval.		
ERCOT Staffing Impacts (across all areas)	Implementation Labor: 100% ERCOT; 0% Vendor Ongoing Requirements: No impacts to ERCOT staffing.		
ERCOT Computer System Impacts	The following ERCOT systems would be impacted: <ul style="list-style-type: none">• Credit, Settlements & Billing Systems		
ERCOT Business Function Impacts	ERCOT will update its business processes to implement this VCMRR.		
Grid Operations & Practices Impacts	No impacts to ERCOT grid operations and practices.		

Evaluation of Interim Solutions or Alternatives for a More Efficient Implementation

None offered.

Comments

None.